CALIFORNIA OCCUPATIONAL GUIDES

EDD Employment Development Department State of California

SURVEYORS

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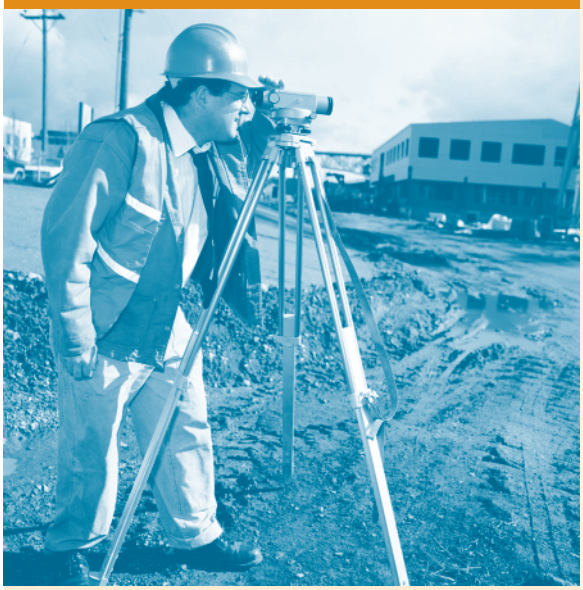
INTEREST AREA
INVESTIGATIVE



WHAT DOES A SURVEYOR DO?

SURVEYORS are responsible for accurate physical descriptions of property boundaries and topography for construction and engineering projects. Survey results are used to establish official boundaries, prepare maps and exhibits, write descriptions of land tracts that satisfy legal requirements, assist in setting land values, subdivide land into lots, stake development sites, and produce various surveying documents. Surveyors also extend their surveys to deep underground, the ocean floor, and extraterrestrial space.

In the eighteenth and nineteenth centuries, pioneers and homesteaders used landmarks such as specific tree groves, rocks (even rock shapes-such as "ship rock") and riverbanks to record property lines. Modern science has thrust surveying technology into the space age. Today, Global Positioning System (GPS) is the newest land surveying technology. GPS is an electronic system that uses information from earth-orbiting satellites to locate (fixed) points on the ground to establish survey lines. GPS technology has increased in use as the price of GPS equipment has decreased.

Surveyors use mathematical reasoning ability to visualize objects, measure distances, sizes, and other abstract forms. They must be precise and accurate in their work because mistakes can be costly.

Teams or parties of two to four members usually conduct surveys. Survey party roles and tasks are detailed below:

Licensed Professional Land Surveyors (LPLS)

- Direct survey teams and take the legal responsibility for all survey results.
- Write descriptions of land for deeds, leases, and other legal documents.
- Research legal records for evidence of previous boundaries.
- Interpret and check GPS results.
- Prepare survey maps.
- Prepare subdivision maps.

Party Chiefs

- Plan and supervise daily activities of survey teams working directly under the LPLS.
- Verify the accuracy of measurements and calculations at survey sites.

Land Surveyor Technicians

- Operate standard and complex survey instruments to measure horizontal and vertical angles and GPS positioning.
- Use electronic distance-measuring instruments and GPS receivers.
- Compile notes, sketches, and records of measurement data.
- Operate data collection devices.

Surveyor Assistants (Rod and Chain Persons)

- Hold vertical rods in place while technicians sight them with special instruments called theodolites to establish distances and angles.
- Clear away brush and trees from the lines of a survey when needed.
- Set up traffic warnings and flag vehicles.
- Set survey stakes and monuments.

Survey teams also spend time in offices planning surveys, drawing maps, preparing reports, and performing computations for completed site surveys. Most private surveying and engineering firms separate field and office duties. Field personnel spend little time doing office duties.

WHAT SKILLS ARE IMPORTANT?

Surveying is a cooperative process, so strong interpersonal skills and the ability to work as part of a team are essential. Other skills, knowledge, and abilities important for survey team members include the following:

- Mathematics – Using mathematics to solve problems.
- Writing – Communicating effectively in writing as appropriate for the needs of the audience.
- Geography – Knowledge of principles and methods for describing the features of land, sea, and air masses, including their physical characteristics, locations, interrelationships, and distribution of plant, animal, and human life.
- Near Vision – The ability to see details at close range (within a few feet of the observer).
- Far Vision – The ability to see details at a distance.
- Computer – Knowledge of hardware and software applications for drafting.
- Reading Comprehension – Understanding written sentences and paragraphs in work-related documents.
- Science – Using scientific rules and methods to solve problems.

WHAT'S THE WORK ENVIRONMENT?

Survey teams spend much of their time outdoors and often perform strenuous work carrying heavy packs of equipment long distances over difficult terrain. Workers also stand for long periods. They cut brush and drive stakes with four to eight-pound sledgehammers. They are subject to all kinds of weather as well as sunburn, poison oak, and snake and insect bites. Potential danger on construction projects comes from falling objects, moving vehicles, and heavy equipment. The work requires the ability to communicate by hand signals over great distances. Occasionally, workers must drive long distances to survey sites. Surveyors must possess a valid California driver's license to be able to commute to survey sites.

Union Membership

Many survey workers in the construction industry belong to the International Union of Operating Engineers, Local 3 in Northern California, and Local 12 in Southern California. Surveyors working for government may join public employee unions.

WHAT'S THE CALIFORNIA JOB OUTLOOK?

The following information is from the occupational projections produced by the Employment Development Department (EDD) Labor Market Information Division (LMID):

Surveyors

Estimated number of workers in 2000:	5,300
Estimated number of workers in 2010:	5,900
Projected Growth 2000-2010:	11.3%
Est. openings due to separations by 2010:	1,700

These figures do not include self-employment.

Surveyors will grow slower than average compared with all occupations in California.

Surveying and Mapping Technicians

Estimated number of workers in 2000:	3,200
Estimated number of workers in 2010:	4,100
Projected Growth 2000-2010:	28.1%
Est. openings due to separations by 2010:	1,200

These figures do not include self-employment.

Surveying and Mapping Technicians represents a broad occupational group that includes Party Chiefs. Surveying and Mapping Technicians will grow faster than average compared with all occupations in California.

Additional job openings will occur as workers retire, change careers, or leave the labor market.

Trends

Employment opportunities may fluctuate from year to year because of close ties with construction activity. Growth is expected in rapid transportation systems and highway construction. Use of electronic distance-measuring equipment and GPS may limit employment growth.

WHAT DOES THE JOB PAY?

California Earnings

Surveyors 2002 Wages

Hourly wages range from	$24.02	to	$33.19
Average hourly wage	$28.22		
Average annual wage	$58,707		

Surveyors and Mapping Technicians 2002 Wages

Hourly wages range from	$16.58	to	$27.11
Average hourly wage	$21.83		
Average annual wage	$45,407		

Source: Occupational Employment Survey of Employers by EDD/LMID.

Salaries for Surveying Technicians vary widely depending on experience, training, talent, type of employer, and specific tasks performed. As of March 1, 2002 the starting wages for each step for Surveyors in the Operating Engineers union are as follows: Surveying Apprentices, $13.66; Chain Person, $27.31; Instrument Person, $30.19; and Party Chiefs, $33.28 an hour. Licensed Land Surveyors earn $33.75 an hour (after 2000 hours $34.32).

Hours

Surveying teams usually work a five-day, forty-hour week. However, many Surveyors work seasonally, especially in the construction industry where they work only during dry weather, typically from March through November. According to the Southern California Joint Apprenticeship Committee, Surveyors work an average of 1700 hours a year.

Benefits

Benefits usually include medical, dental, and vision insurance, retirement plans, vacation, and holidays.

HOW DO I PREPARE FOR THE JOB?

Education and Training

High school students should take courses in algebra, geometry, computer science, drafting, and mechanical drawing to prepare for land surveying occupations. Community college or technical school coursework in surveying and mapping technology prepares students for work in government, engineering, and utility companies.

Fresno State University offers a bachelor degree in surveying and mapping technology in their engineering department. California Polytechnical Institute at Pomona offers an engineering degree with a survey option.

California is the only State that has a formal apprenticeship program for Surveyors in the construction industry. Applicants must be at least eighteen years old, be physically able to perform all phases of the work, and have a valid driver's license. They need to read, write, and speak English at the level necessary for success in the classroom and to safeguard themselves and co-workers on the job. Applicants must also show proof of high school graduation or an equivalent certificate, complete all application forms, and

pass a qualification test. The apprenticeship program leads to journey-level Rod and Chain Person and then to Chief of Party and Certified Chief of Party. Chief of Party Surveyors can advance to Licensed Land Surveyors by meeting the work experience and written exam requirements of the California Board for Professional Engineers and Land Surveyors.

The Inland Empire Job Corps training program in San Bernardino offers a pre-apprenticeship training program for Land Surveyors. Job Corps is available to disadvantaged youth, ages 16 through 25 years of age.

Licensing and Certification

The California Board for Professional Engineers and Land Surveyors licenses Surveyors who establish boundaries. Applicants need six years of land surveying experience to qualify for a license, including one year of responsible field training and one year of responsible office training. Graduates from an approved four-year curriculum in land surveying receive credit for four years of experience. The American Congress on Surveying and Mapping offers voluntary certification for Surveying Technicians. Progressive experience and passing written examinations certify Technicians at four levels. Although not required for State licensure, many employers require professional certification for promotion to positions of greater responsibility.

Continuing Education

New technologies, such as GPS, enhance employment and advancement opportunities for Surveyors and Surveying Technicians trained to use these systems.

HOW DO I FIND THE JOB?

Construction contractors, engineering, architectural, and surveying firms, local government agencies, redevelopment agencies, and electric and gas utility companies employ about 80 percent of these workers. They also work for agri-business, water districts and federal, State, county, and city government agencies. Government agencies hire Surveyors in areas such as public works, highway departments, land management, natural resources planning, and national defense.

Direct application to employers remains one of the most effective job search methods. Private firms that hire surveying occupations are listed in the yellow pages under the following headings: Digital Engineers-Civil, Engineers-Consulting, Engineers-Earthquake, Engineers-Environmental, Engineers-Geotechnical, Surveyors-Land, and Utility Companies. California job openings can be found at various online job-listing systems including CalJOBS℠ at www.caljobs.ca.gov or at America's Job Bank at www.ajb.dni.us.

For other occupational and wage information and a listing of the largest employers in any county, visit the Employment Development Department Labor Market Information Web page at www.calmis.ca.gov. Find further job search assistance from your nearest Job Service office, www.edd.ca.gov/isloc.htm or the closest One-Stop site listed on the California WorkNet site, www.sjtcc.ca.gov/sjtccweb/one-stop.

WHERE CAN THIS JOB LEAD?

With experience, the career path leads to Rod and Chain Person or Land Survey Technician, then Chief of Party and, finally, to Licensed Land Surveyor. Some Surveyors go on to management positions such as field engineers; others take advanced training to become civil engineers.

OTHER SOURCES OF INFORMATION

CA Division of Apprenticeship Standards
For the closest district office, visit
www.dir.ca.gov/DAS/das.html,
or call Apprenticeship Standards
Information listed in your telephone
directory business white pages

The California Land Surveyors Association
P.O. Box 9098
Santa Rosa, CA 95405-9990
(707) 578-6016
www.ca-surveyors.org

Board for Professional Engineers
and Land Surveyors
P.O. Box 349002
Sacramento, CA 95834-9002
(916) 263-2222
www.dca.ca.gov/pels

Northern California Surveyors
Joint Apprenticeship Committee
1620 South Loop Road
Alameda, CA 94502
(510) 748-7413
www.ncsjac.org

Southern California Surveyors
Joint Apprenticeship Committee
709 Brea Canyon Road, Suite 2
Walnut, CA 91789-3083
(909) 598-2652
www.scsurveyjac.org

Inland Empire Job Corps Center
3173 Kerry Street
San Bernardino, CA 92407
(909) 887-6305, Ext. 203
http://jobcorps.doleta.gov

The American Congress on Surveying and Mapping
6 Montgomery Village Avenue, Suite 403
Gaithersburg, MD 20879
(240) 632-9716
www.acsm.net

Employment Projections by Occupation
www.calmis.ca.gov/htmlfile/subject/occproj.htm

Employment and Wages by Occupation
www.calmis.ca.gov/file/occup$/OES$.htm

RELATED OCCUPATIONAL GUIDES

Landscape Architects	No. 216
Right-of-Way Agents	No. 226
Drafting Occupations	No. 338
Cartographers (Map Makers)	No. 517
Geographic Information Systems (GIS) Specialists	No. 554

OCCUPATIONAL CODE REFERENCES

SOC *(Standard Occupational Classification)*

Surveyors	17-1022
Surveying and Mapping Technicians	17-3031

O*NET *(Occupational Information Network)*

Surveyors	17-1022.00
Surveying Technicians	17-3031.01

OES *(Occupational Employment Statistics)*

Surveying and Mapping Scientists	22311
Surveying and Mapping Technicians	22521

DOT *(Dictionary of Occupational Titles)*

Chief of Party	018.167-010
Land Surveyor	018.167-018